

CHAPTER THREE

ENERGY



CHAPTER 3: ENERGY

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

Department Mission and Built Infrastructure

Since 2008, CDCR has engaged in a collaborative effort through the California Investor-Owned Utilities (IOU)/CDCR Energy Efficiency Partnership Program to improve energy efficiency at its existing facilities. As of 2018, CDCR has completed 108 energy efficiency and savings by design projects that have yielded a combined GHGe reduction of 69,891 metric tons per year and an annual cost savings of \$8,682,234. From the time period of 2019 through 2022, CDCR has identified 51 additional energy efficiency and savings by design projects. These projects are expected to provide annual cost savings of \$884,368 and an additional GHGe reduction of 6538 metric tons per year.

DECREASED ENERGY USE
At 33 of 39 sites since 2013

CDCR has been the leader within State government accomplishing the objectives set forth in EO B-18-12 for State buildings using clean on-site power generation, such as solar photovoltaic and wind power generation.

Through third-party Solar Power Purchase Agreements (SPPA), As of December 2019, CDCR has completed 23 on-site renewable solar generation projects at 17 institutions totaling 57 megawatts (MW AC) and awarded 21 projects, which will provide an additional 61 MW of solar energy. CDCR also constructed 3 wind turbine projects that provide 5.5 MW of renewable wind energy. CDCR's statewide renewable energy portfolio is positioned to exceed 118 MW by the end of 2022. CDCR is considering battery storage and micro-grid to further energy and cost savings and resiliency.

To ensure energy efficiency at its newest facilities, CDCR has managed the design and construction of 61 new buildings that have achieved U.S. Green Building Council (USGBC) Leadership in Energy and Environmental Design (LEED) Certification of a Silver level or higher. In addition, CDCR occupies eight LEED-certified leased buildings. CDCR has identified an additional 9 projects that will be designed to meet or exceed the LEED Silver certification standards. There are also over 150 Health Care Facility Improvement Program (HCFIP) sub-projects currently being constructed that are designed to meet CALGREEN standards. Finally, CDCR has identified several potential ZNE building projects that are currently in design or are in the certification process.

These programs, partnerships, and overall CDCR efforts have led to a 12 percent decrease in grid based- energy purchases and a 23 percent decrease in the

overall Energy Usage Index (EUI) rate since 2003, despite a 20 percent increase in the total institutional square footage footprint.

Through the continued efforts of CDCR's current and ongoing programs, projects, and objectives, CDCR is on track to meet or exceed the energy and renewables goals and objectives set forth by the Administration and its own ambitious sustainability agenda, including being a leader in advancing and meeting the goals and objectives of EOs B-18-12 and B-16-12.

- Correctional facilities must provide the confined inmate population with most of the services available in a small city; the infrastructure includes a wide variety of essential buildings and systems including: housing units, kitchen and dining facilities, medical, dental, mental health and substance abuse treatment space, pharmacies, laboratories, classrooms, chapels, libraries, recreation areas, vocational and industry space, firehouse, laundry, warehouse, wastewater treatment and water plant operations, administrative offices, staff training, and inmate and staff records space. All operations must occur in a secure environment, requiring correctional facilities to have various features and systems to provide both internal and perimeter security.
- The correctional facilities include complex and extensive energy, utility, and telecommunications systems, as well as an electronic security infrastructure. In addition, due to their size and often remote location, many operate their own potable water and wastewater treatment systems. Some facilities have cogeneration that produces part of their electrical power. Energy efficiency projects for the Department must take into account the infrastructure needs of each institution before projects can proceed. **Table 15** below details the types of energy purchased by CDCR in 2018.

**Table 15- Total Purchased Energy 2018 (excluding Renewables)
Facility Data Workbook Table 3.1**

Purchased Energy	2003 Baseline Quantity	2003 Cost (\$)	2018 Quantity	2018 Cost (\$)	% Qty. Change	% Cost Change
Electricity	618,146,519 kWh	\$61,325,942	598,191,696 kWh	\$63,595,476	-3%	4%
Natural Gas	44,077,892 therms	\$25,683,588	37,139,746 therms	\$20,037,855	-16%	-22%
Propane	N/A	N/A	13,788 gallons	\$19,459	0%	0%
TOTALS	6,339,377,948 kBtu Site	\$87,009,530	5,800,509,478 kBtu Site	\$83,652,791	-9%	-4%

It is important to quantify the energy intensity of each facility as detailed in **Table 16**. This allows CDCR to review its priorities when evaluating opportunities.

**Table 16- CDCR Institutions with Largest Energy Consumption (including Renewables)
Facility Data Workbook Table 3.2**

Building Name	Floor	Site Energy (kBTU)	Source Energy (kBTU)	Source EUI (kBTU/ft ² -yr)
COR	1,652,194	398,159,907	837,406,582	241
ASP	1,671,840	376,859,708	445,688,431	225
SAC	1,359,429	368,818,934	588,787,188	271
CIM	1,774,872	331,645,238	586,038,901	187
CCC	756,314	315,463,282	424,317,120	417
CMF	1,178,424	258,637,464	378,263,477	219
CMC	1,468,039	217,487,709	349,993,536	148
SQ	1,739,250	214,073,199	321,072,088	123
MCSP	2,037,379	198,347,646	418,066,469	97
CHCF	3,235,916	175,826,651	385,842,615	54
Total for Buildings in This Table	16,873,657	2,855,319,738	4,735,476,408	---
Total for All Department Buildings	49,725,763	5,800,509,478	10,327,641,357	---
Percent of Totals	34%	49%	46%	---

- Given the data above, CCC has the highest energy intensity consumption. This is due to the age of the facility (built in 1963), and antiquated equipment/systems. Currently, CCC purchases electricity from Plumas Sierra Rural Electric Cooperative (PSREC), which does not offer any financing options for implementing energy efficiency projects. CDCR is exploring financing opportunities to initiate and develop energy efficiency projects at this facility.
- ASP has a cogeneration plant that uses natural gas to produce electricity, and thus the site energy consumption appears high; however, this facility purchases minimal electricity from the grid.
- CIM does not purchase significant amounts of energy from the grid. It is currently under a 30-year Power Purchase Agreement (PPA) that provides both electricity and steam to the facility. CDCR is currently working with DGS on a new seven-year contract to continue purchasing energy off-the-grid. In 2019, CDCR initiated a multi-measure energy efficiency project at CIM. Anticipate energy usage to reduce during the next reporting cycle.
- In 2019 an energy-efficiency project was completed at CMC, which included interior and exterior lighting measures, as well as the replacement of dorm water heaters. CDCR utilized On-Bill financing and Special Repair Project funds for this project. Anticipate energy usage to reduce during the next reporting cycle.

- In 2019, an energy efficiency lighting project was completed at COR utilizing On-Bill Financing to fund this project. Anticipate energy usage to reduce during the next reporting cycle.
- In 2019, solar canopies (1.3 total MW's) were installed at CSP-Sac and FSP. Anticipate energy usage to reduce during the next reporting cycle.
- A 2 MW solar canopy system is planned to be installed at MCSP during 2020. Anticipate energy usage to reduce during the next reporting cycle.

CDCR's Challenges in Meeting State Goals

- Security – CDCR's mission to improve public safety through law enforcement that provides for the safe and secure incarceration of the State's most serious and violent felons and to provide parole supervision and develop and implement rehabilitative strategies to successfully reintegrate offenders back into their communities is the first priority of the Department. As such, security requirements sometimes limit the energy efficiency options available to the Department. One example is that LED lighting is not currently approved for use in inmate cells due to the metal strips found within the lamps that can be used by the inmates as weapon stock. CDCR follows Design Criteria Guidelines (DCG) and policies that ensure safety and security for inmates, staff, and the public. All new technologies must be analyzed, reviewed, and approved by the CDCR Design and Environmental Services and Standards Branch (DESS).
- Needs of 24-hour operations – Unlike typical office environments that have limited hours of operation, CDCR operates on a 24-hour basis, which is much longer than many other State Agencies.
- Unique utility drivers – The size of CDCR institutions has created a need to function independently of typical city-provided services. Unlike typical office building environments, CDCR runs water and wastewater plants serving its facilities. These systems are often expensive to replace with higher efficiency systems, leading to increased costs until sufficient funding is identified.
- Financing – Despite the challenge of implementing energy-related projects without a budget line item specifically designated for energy efficiency, CDCR has been successful in fulfilling many of the mandates of energy efficiency and sustainability. CDCR has sought out various funding opportunities as they become available and has taken the lead in promoting additional funding opportunities by participating in policy discussions on topics such as OBF and On-Bill Repayment (OBR). CDCR has utilized multiple funding opportunities including Green Seal \$Mart loans, OBF, American Recovery and Reinvestment Act (ARRA) loans, Energy Conservation Assistance Act (ECAA) loans, and SPPAs.
 - One challenge of the existing OBF program is funding limitation caps per site and/or utility account, CDCR has had to limit the scope of energy

efficiency projects in order to remain under established loan caps. The IOUs are working with CDCR and the California Public Utilities Commission (CPUC) to raise OBF loan caps where feasible.

- Aging infrastructure – Facility condition assessments conducted by a third party have identified a backlog of infrastructure repairs and replacements at a cost of approximately \$13.8 billion. Current funding levels are substantially insufficient to address this backlog with efficiency projects competing for these fiscal resources as well. Where possible, though, CDCR has tried to pair a needed infrastructure repair or replacement with an energy efficiency opportunity that is third-party financed (i.e., loans, rebates, etc.) to address both areas.
- Incentives for EEMs – Some of the potential measures that align with CDCR's energy efficiency goals no longer qualify for incentives, which exclude the measures from OBF. A few examples include the replacement of incandescent lights with LED lights, replacing exit signs, and replacing linear fluorescents with LEDs. If the measures do not qualify for the incentive/OBF, then facilities that have outdated technology may not have a project initiated unless alternate funding is available.
- Lack of designated Energy Star category for correctional facilities – To obtain LEED EB, a property owner is required to achieve an Energy Star Rating of at least 75 percent; however, the EPA's Energy Star program does not have an established category for correctional facilities.
- Networking capabilities – CDCR is limited on the availability of a connectivity backbone to implement facility-wide energy management systems (EMS). The existing infrastructure backbone is either not serviced any longer or only available for Health Care services. Installation of EMS becomes cost-prohibitive if a backbone has to be added as part of the cost of the energy efficiency project. Other networking paths will have to be evaluated for feasibility and cost-effectiveness.

Some examples of CDCR's promotion of the State's energy and sustainability goals include:

- CDCR actively promotes these goals through its Sustainability Program website and involvement of these goals at the highest levels of the Department, in addition to participating in many programs that promote sustainability goals.
 - US EPA Green Power Partnership member
 - Carbon Footprint (previously known as Climate Registry) member
 - Governor's Sustainability Task Force member
- Sixty-nine LEED certified buildings completed.

- CDCR's FPCM produces a monthly executive briefing document of all energy projects, planned or in progress, to ensure CDCR executives are actively engaged in the Department's commitment to the State's energy and sustainability goals. This report tracks CDCR's progress in meeting these goals and also identifies any challenges so they can be resolved accordingly.
- CDCR is the first and only State Agency/department to solicit and award wind-generated power for its facilities, with three wind turbines totaling 5.5 MW fully operational in 2019.
- CDCR includes a third-party sustainability consultant as well as a commissioning agent on its major construction projects to ensure compliance with its sustainability goals.

CDCR's Five-Year Capital Improvement Program

CDCR prepares a *Five-Year Infrastructure Plan (Plan)* which provides a narrative report summarizing the Department's Capital Outlay priorities that are anticipated over the next five years. The Plan is submitted along with the fully developed Capital Outlay Budget Change Proposals for the first year represented in the Plan, along with Budget Concept Statements for each proposal for which funding will be pursued in the four subsequent out-years. The Plan includes the following sections: Infrastructure, Facility Maintenance, Energy, and Categorized Proposals (Fire/Life/Safety, Health Care, Housing, Adult Programs, Security, Support Services, and Utilities).

CDCR also develops a Master Plan Annual Report (MPAR). This report includes proposed projects contained in the Department's most current *Five-Year Infrastructure Plan*, active and completed projects within the reporting period, and narrative sections on population, Gap Chart, infrastructure, housing needs, adult healthcare, and institution project summaries.

CDCR's efforts in energy management, sustainability, and conservation to meet the Governor's EOs, existing laws, and regulations are documented within these reports.

Per California Penal Code Section 7000 and 7001 (provided below), CDCR has the authority to plan and construct facilities and renovations included within the Department's master plan. Depending on workload, CDCR may delegate a portion of these projects to DGS, some of which may be energy-related projects. CDCR and DGS project teams conduct ongoing meetings to monitor this workload.

California Penal Code Section 7000

- (a)The Department of Corrections and Rehabilitation shall prepare plans for, and construct facilities and renovations included within, its master plan for which funds have been appropriated by the Legislature.

(b)“Master plan” means the department's “Facility Requirements Plan,” dated April 7, 1980, and any subsequent revisions.

California Penal Code Section 7001

Any power, function, or jurisdiction for planning or construction of facilities or renovations pursuant to the master plan, which is conferred by statute upon the Department of General Services (DGS), shall be deemed to be conferred upon the department.

Zero Net Energy (ZNE)

The Governor has set forth the following ZNE milestones for State buildings:

- 2017 – 100 percent of new construction, major renovations and build-to-suit leases beginning design after October 23, 2017 to be ZNE
- 2025 – 50 percent of total existing building area will be ZNE

CDCR seeks to achieve ZNE at its institutions by reducing energy demand and maximizing on-site energy generation, where feasible, without jeopardizing CDCR's Mission. Projects must be designed with EEMs and evaluated consistent with the ZNE Guidelines.

CDCR's challenges in meeting the Governor's ZNE goals:

- Magnitude - The size and age of many CDCR facilities results in high energy use requiring substantial renewable power for offset.
- Location - Many CDCR institutions are in remote areas not in the IOU territories, which restricts the funding sources available for EEMs. Additionally, many CDCR institutions are in areas with climate concerns - extremes that lead to higher than average energy use as well as difficult construction conditions much of each year.
- Security - Correctional security requirements restrict some power-saving measures such as lighting level reductions in inmate-accessible areas and providing trellises or other shade structures on exterior walls within the secure perimeters of the prisons.
- Land availability - CDCR has made great progress in achieving more renewable generation through on-site solar fields at a significant number of its facilities, and wind generation at three sites. However, some prisons do not have the available land to achieve this and some of these sites may not be appropriate for wind power generation due to environmental restrictions regarding bird habitat. Where possible, CDCR has shifted to installing solar canopies in its parking lots despite some initial concerns that these structures could “hide” suspicious activities on prison grounds that may pose security challenges to CDCR.

- Deferred maintenance - With its aging portfolio, the challenge of ensuring that 50 percent of this existing stock meets ZNE requirements must be balanced with limited funding available to meet the needs associated with aging and obsolescence.

CDCR's approach to new construction to achieve the Governor's ZNE goals for State buildings is detailed in CDCR's FPCM Project Procedures Manual (PPM) and DCGs. The following are significant excerpts/paraphrases from each manual.

Project Procedures Manual on ZNE

Each project managed by CDCR's Project Management Branch (PMB) must have a Project Management Plan developed specifically for the project that will include and address each element of the PPM. The Project Management Plan Guideline directs the following in its Sustainable Design Guidelines (SDG) and ZNE article:

- The Project Director (PD) must review each project for incorporation of sustainable design and ZNE Certification. In this review, the PD must identify the current EO and version of USGBC's LEED criteria applicable to the project, as well as outlining the documentation that will be required under LEED and ZNE Certification and develop a project-specific plan to implement sustainable design guidelines.
- During the establishment of the project scope and budget, CDCR will determine if the project will be ZNE-certified and identify the method that renewable, on-site energy generation will be provided.
- The PD must meet with CDCR's Energy and Sustainability Section (ESS), determine the most appropriate path for compliance with the current EO based on the options identified in the CDCR SDG (ZNE-certified or exempt), and review project constraints that may affect eligibility for ZNE Certification and/or use of sustainable practices.

Design and Construction Guidelines on ZNE

The CDCR's SDG for use by State and contracted architectural and engineering firms designing CDCR projects establishes general sustainable design principles for the design of correctional facilities for CDCR, in accordance with current administrative directives, regulatory requirements, and its policies. The SDG is incorporated into the DCG, and also serves as a reference for the DCG as it relates to sustainability. The SDG is updated periodically to incorporate new or revised documents that affect LEED certification requirements, ZNE Certification, regulatory requirements, CDCR policies, and Title 24 requirements.

Key components relative to ZNE goals and mandates include:

- CDCR will self-certify ZNE compliance in accordance with the SDG.

- Sixteen key excerpts from EO B-18-12, its accompanying *Green Building Action Plan*, and MM 15-04 are listed as applicable to CDCR design and construction.
- CDCR adopted definitions for “Zero Energy Building”, “Zero Energy Campus”, and “Zero Energy Portfolio” consistent with the U.S. Department of Energy and the State of California’s *State Agency Compliance* with EO B-18-12 definitions for ZNE.
- New buildings and major renovations will be evaluated separately from the existing institutions’ buildings.
- New buildings and major renovation will exceed the requirements of Title 24, Part 6 –Building Energy Efficiency Standards by a minimum of 15 percent, prior to the use of on-site renewables.
- New buildings and major renovation will be provided sufficient metering to document actual ZNE performance and support future Monitoring Based Commissioning (MBCx).
- New buildings and major renovation may utilize existing on-site energy generation for ZNE, provided that the existing on-site generation is available and not designated for other applications. If no on-site energy generation is available, the new building will need to include new renewable energy generation to achieve ZNE.
- It is CDCR’s intent to maximize the total building area that is certified as ZNE at each adult institution and youth facility, based on available on-site renewable energy generation. CDCR reserves the right to exempt buildings from ZNE requirements if public safety is jeopardized by pursuing ZNE certification.
- Existing institutions and youth facilities will be evaluated as a campus utilizing CDCR’s ZNE Procedure that is part of CDCR’s FPCM PPM.
- Pursuant to the State authorized exemptions³, CDCR will exempt the following from ZNE calculations:
 - Site Security Lighting
 - Lethal Electrified Fence
 - Water Treatment
 - Wastewater Treatment
 - Electric Vehicle
- It is CDCR’s intent to comply with the ZNE requirements for State Agencies outlined in EO B-18-12 for its portfolio of adult institutions and youth facilities.

³ MM 14-07 Standard Operating Efficiency Procedures shall be followed to next extent they do not conflict with health and safety requirements or operations necessary for CDCR to fulfill its mission and responsibilities.

- CDCR intends to certify a minimum of 50 percent of existing building area throughout its entire portfolio. However, with over 48 million square feet of existing buildings it will be extremely challenging to improve the efficiencies or achieve the ZNE requirements for a substantial portion of this inventory without a major influx of funding. Building area will be determined by the values indicated in the Energy Star Portfolio Manager (ESPM) database.
- CDCR's designated ZNE projects will be certified as either ZNE buildings or ZNE campuses (or potentially a ZNE portfolio). CDCR's FPCM will utilize a reporting document to track ZNE performance for the building, campus, or portfolio certified. The document will track annual Total Energy Production and Total Energy Consumption for each ZNE-designated project on a monthly basis for each calendar year at the completion of the project. **Table 17** (below) provides an overall review of the CDCR portfolio while **Table 18** details each ZNE project at each institution.

**Table 17- Zero Net Energy Buildings
Facility Data Workbook Table 3.3**

Status of ZNE Buildings	Number of Institutions	Floor Area (ft²)
Buildings Completed and Verified	0	0
Buildings in Design (50-Bed MH-- CIM, RJD)	2	139,048
Under Construction or Completed (portion of ISP campus, HCPIP: CCI, CCWF, CMC, COR, CTF, CVSP, FSP, LAC, MCSP, NKSP, RJD, SAC, SOL, SVSP, WSP)	16	601,308
Building Proposed for Before 2025 but not yet in design	0	0
Totals for Institutions' ZNE Buildings by 2025	17	740,356
Totals for All Institutions by 2025	45	50,096,991
% ZNE by 2025	38%	1%

Table 18- Zero Net Energy Projects

Institution	Project Name	Building Name	Status	Floor Area (SF)
CIM	50-Bed MH	50- Bed Mental Health Crisis Facility	In Design	69,524
CCI	HCPIP SP#2	New Pharmacy and Laboratory Building	Construction Complete, Auditing Phase	2,205
	HCPIP SP #5	Facility D Primary Care Clinic	In Construction	3,876

Institution	Project Name	Building Name	Status	Floor Area (SF)
CCWF	HCFIP SP#6	Facility E Primary Care Clinic	Construction Complete, Auditing Phase	3,876
CCWF	HCFIP SP#4	New Pharmacy	In Construction	2,244
CMC	HCFIP SP#1	New West Facility Primary Care Clinic	Construction Complete, Auditing Phase	5,268
	HCFIP SP#4	New East Facility Primary Care Clinic and Health Care Administration Building	In Construction	13,044
	HCFIP SP#5	New Pharmacy and Laboratory Building	Construction Complete, Auditing Phase	3,000
	HCFIP SP#6	New East Facility ASU Primary Care and ASU-EOP Mental Health Clinic	In Construction	11,000
COR	HCFIP SP#2	New ASU Primary Care Clinic	In Construction	2,559
CTF	HCFIP SP#1	New Facility A Primary Care Clinic	Construction Complete, Auditing Phase	3,468
	HCFIP SP#4	New Facility C Primary Care Clinic	Construction Complete, Auditing Phase	4,400
	HCFIP SP#7	New Facility D Primary Care Clinic	Construction Complete, Auditing Phase	3,614
CVSP	HCFIP SP#3	New Health Care Administration and Health Records Building	In Construction	2,880
FSP	HCFIP SP#1	New Minimum Support Facility Primary Care Clinic	Construction Complete, Auditing Phase	3,072
	HCFIP SP#2	New Building 1 Primary Care Clinic	Construction Complete, Auditing Phase	3,268
	HCFIP SP#3	New Central Health Services Building and Education Annex Building	In Construction	17,978
ISP	HVAC	Portion of Campus - Facilities A & B	In Construction	375,000
LAC	HCFIP SP#1	New ASU Primary Care Clinic	Construction Complete, Auditing Phase	2,594
	HCFIP SP#2	New Complex Primary Care Clinic (Facilities A & B)	Construction Complete, Auditing Phase	5,573

Institution	Project Name	Building Name	Status	Floor Area (SF)
LAC	HCFIP SP#3	New Complex Primary Care Clinic (Facilities C & D)	Construction Complete, Auditing Phase	5,573
	HCFIP SP#5	New Health Care Administration and Health Records Building	Construction Complete, Auditing Phase	5,921
MCSP	HCFIP SP#2	New Clothing Exchange Buildings (Facilities A, B and C)	Construction Complete, Auditing Phase	5,357
	HCFIP SP#3	New ASU Primary Care and ASU-EOP Mental Health Clinic	Construction Complete, Auditing Phase	611
	HCFIP SP#4	New Pharmacy and Laboratory Building	Construction Complete, Auditing Phase	2,471
NKSP	HCFIP SP#2	New Facility B Primary Care Clinic	Construction Complete, Auditing Phase	2,873
	HCFIP SP#3	New Facility C Primary Care Clinic	In Construction	4,835
	HCFIP SP#4	New Facility D Primary Care Clinic	Construction Complete, Auditing Phase	3,873
	HCFIP SP#5	New Medication Distribution Rooms (Facilities B & D, 2 each)	Construction Complete, Auditing Phase	2,111
	HCFIP SP#8	New Correctional Case Management Building	Construction Complete, Auditing Phase	5,038
RJD	HCFIP SP#1	New ASU Primary Care and ASU-EOP Mental Health Clinic	Construction Complete, Auditing Phase	9,880
	HCFIP SP#3/8	New Pharmacy and Dialysis Unit Building	Construction Complete, Auditing Phase	8,389
	HCFIP SP#4	New Health Care Administration Building	Construction Complete, Auditing Phase	7,680
	50-Bed MH	50- Bed Mental Health Crisis Facility	In Design (On Hold)	69,524
SAC	HCFIP SP#1	New Facility A PSU-ASU Primary Care Clinic	Construction Complete, Auditing Phase	6,578
	HCFIP SP#3	New Central Health Services Building	Construction Complete, Auditing Phase	28,089

Institution	Project Name	Building Name	Status	Floor Area (SF)
SOL	HCFIP SP#1	New Complex Facility Clinic	Construction Complete, Auditing Phase	12,258
SVSP	HCFIP SP#1	New ASU Primary Care Clinic	Construction Complete, Auditing Phase	2,687
WSP	HCFIP SP#3	New Facility C Primary Care Clinic	In Construction	4,835
	HCFIP SP#4	New Facility D Primary Care Clinic	Construction Complete, Auditing Phase	4,236
	HCFIP SP#5	New Medication Distribution Rooms (Facilities B & D, 2 each)	In Construction	2,111
	HCFIP SP#8	New Correctional Case Management and Health Care Administration Building	Construction Complete, Auditing Phase	6,983

Solar Photovoltaics and Wind Generation with Respect to ZNE

It is the intention of CDCR to ensure that buildings are as energy efficient as possible before applying renewable power to achieve ZNE per MM 2017-04 (*Zero Net Energy for New and Existing State Buildings*). Energy Efficiency Measures (EEM) with Respect to ZNE

EEMs and issues that CDCR consider in the design of new buildings include:

- Site location
- Insulation on exterior vs interior, to expose thermal mass to occupied areas
- Phase change material (PCM) on walls or ceiling
- Shade trellis on walls
- Shading devices for windows
- Building orientation on the site
- Lighting Power Density
- Daylight controls
- Occupancy sensors
- Exterior lighting controls and type
- Daylighting, including solar tubes and high clerestory glass
- HVAC system type (e.g. Variable Refrigerant Flow)
- Heat pump water heater

- Heat waste reuse
- Plug load management
- Operating hours
- Thermal storage
- Energy cost
- Temperature comfort range
- Evaporative pre-cool outside air
- Battery Storage
- Micro-grid

New Construction Exceeds Title 24 by 15 Percent

All new State building and major renovations beginning design after July 1, 2012, are required to exceed the current California Code of Regulations (CCR) Title 24, energy requirements by 15 percent.

Although prisons are specifically exempted under Title 24 (Part 6, California Energy Code for Non-Residential Buildings, current edition, Institutional Group I buildings) due to their unique construction characteristics, CDCR has nonetheless imposed Title 24 adherence and, in certain instances, this later standard of exceedance in design criteria used by selected architectural firms.

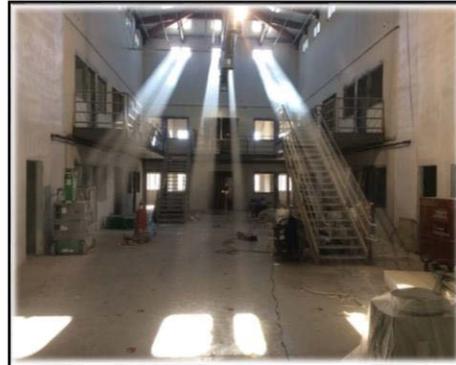
69 USGBC® CERTIFIED BUILDINGS
All LEED Silver® level or higher

The following projects completed since July 2012 were designed to meet this requirement:

- Dewitt Nelson Correctional Annex (now operating as the California Health Care Facility (CHCF)), Facility E: The two largest new buildings (greater than 10,000 sf) were each required to demonstrate their design to reduce their building baseline energy profile by at least 26 percent below a Title 24 minimum energy requirement baseline.
 - SBD documents for the two new buildings document that the Whole Building Approach to qualification was used and resulted in a model exceeding Title 24 by 28.9 percent and 35.3 percent.

- Mule Creek State Prison (MCSP) Level II Dorm Complex
 - SBD documents that used a Whole Building Approach to qualification (EnergyPro 5.1) was used and resulted in a model exceeding Title 24 by 17.6 percent.

Figure 11- Daylighting in MCSP Level II Dorms



- Richard J. Donovan (RJD) Level II Dorm Facility
 - LEED 2009 EA Prerequisite 2: Minimum Energy Performance documentation for the Whole Building Energy Simulation for the three housing dorm buildings resulted in a percent cost savings of 23.5, 23.5 and 23.9 percent.

**Table 19- New Construction/Major Renovations Exceeding Title 24 by 15%
Facility Data Workbook Table 3.4**

Projects Exceeding Title 24 by 15%	Number of Institutions with Projects	Floor Area (ft ²)
Completed Since July 2012	24	1,677,278
Under Design or Construction	23	362,273
Proposed Before 2025	7	8,955

Figure 12- 50-Bed Mental Health Crisis Facility Conceptual Design - CIM



Design and Construction Guidelines on Exceeding Title 24

As mentioned previously, the unique nature of correctional facility construction has allowed CDCR facilities to be exempt under Title 24. However, CDCR has incorporated energy-efficiency requirements into its design criteria documents. New construction and major renovation projects in CDCR's *Five-Year Infrastructure Plan* which are not exempted from Title 24 will be designed to exceed Title 24 by 15 percent.

As previously stated, the SDG establishes general sustainable design principles for the design of correctional facilities for CDCR and serves as a reference in regard to LEED and ZNE certification, regulatory requirements, CDCR policies, and Title 24 requirements, among other things.

- The SDG requires energy modeling to demonstrate that the project meets energy targets established by EOs, CDCR, LEED energy-efficiency prerequisites and credits, and requirements for SBD incentive applications.
- Design decisions must be based on energy modeling and life-cycle cost analysis.

Reduce Purchased Grid-Based Energy 20 Percent by 2018

EO B-18-12 requires State Agencies to reduce grid-based energy purchased by 20 percent by 2018, compared with a 2003 baseline.

CDCR is reducing its grid-based energy purchases through a variety of efforts, ranging from energy-efficiency programs to LEED certification, renewable-energy installations to environmentally preferred purchasing, and operation practices to maintenance. All of these are integral to reducing CDCR's load on the grid.

Institutional Operations and Maintenance

The CDCR Energy and Sustainability Section (ESS) maintains ongoing communications with all institutions to ensure that each is aware of the requirements of the *Green Building Action Plan*. In early 2018, CDCR designated Sustainability Coordinators at each institution. The Sustainability Coordinators are the primary point of contact working directly with the ESS to ensure their institution continues to achieve sustainability goals and requirements set forth by the Administration. The ESS updates the institutions on changes to energy and sustainability mandates at the annual Associate Warden/Plant Managers conference. CDCR annually distributes Standard Operating Procedures for Energy Management in State Buildings as a reminder of the specific responsibilities for all CDCR employees.

CDCR's Department Operations Manual and the Facilities Asset Management Branch (FAMB) provide the operations and maintenance policies and procedures for all institutions. Each institution is responsible for developing and

updating a Plant Operations Manual. Included in that Manual are detailed instructions for implementing a comprehensive maintenance program in accordance with the specific needs of the facility. CDCR's electronic Statewide Automated Preventive Maintenance System (SAPMS) is used to track all preventive maintenance and repair work for lighting, cooling and heating systems, kitchen equipment, mechanical systems, electrical systems and all other equipment/repairs throughout each institution. SAPMS currently relies heavily on the maintenance requirements needed to comply with regulations or the requirements of the equipment asset itself.

Due to the unique nature of CDCR's facilities, there are limitations on the type of energy efficiency measures that can be implemented at each institution. Some constraints are:

- CDCR facilities operate on a 24/7 schedule so lighting and HVAC electricity usage cannot be minimized outside of normal building hours.
- CDCR only has two facilities that have a facility-wide Energy Management System (EMS): California State Prison - Corcoran and CHCF in Stockton. The majority of CDCR's building square footage is not air-conditioned and must comply with the DCG established for each occupancy location and type, so there are few building HVAC controls that can be set to allow for a ± 2 -degree fluctuation from the temperature set point.
- CDCR must maintain lighting levels consistent with the DCG in interior and exterior locations for security purposes, or in places where services, such as classrooms or healthcare, are provided in accordance with the requirements of the tasks performed.
- CDCR has some incandescent lights in areas such as mechanical/electrical rooms, janitor/storage closets, and restrooms. This lighting type is being replaced through attrition or through energy-efficiency projects.
- Lighting controls are installed as part of energy projects. Most institutions have lighting controls in areas that are not inmate accessible.

Department-wide Energy Trends

Compared to the baseline year of 2003, CDCR as of December 31, 2018, had a 27.5 percent increase to the Department's overall building area, which is expected to increase to 28 percent over 2003 by the end of 2019. The total energy consumption for the Department is over 5.5 billion kBTU with a site average EUI of 117.

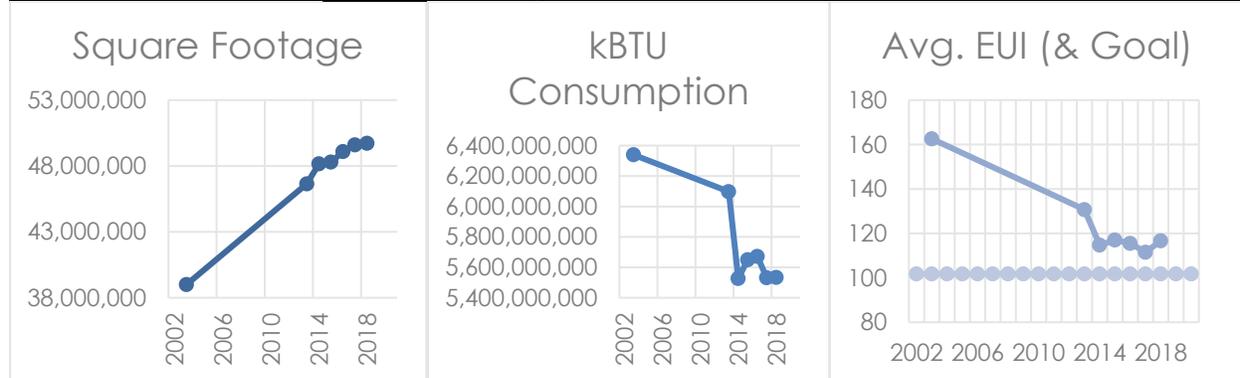
For 2018, the energy usage decreased for 32 of CDCR's State-owned facilities, increased for 12 facilities, and one facility had no EUI trend as it was new and has no 2003 baseline. Department-wide, this represents a reduction of over half-a-billion kBTU's and a 13 percent decrease when compared to the 2003 baseline.

In light of increases in 2015, 2016 and 2018, the Department's average site EUI rate has decreased as well. As previously noted in the challenges section, there currently is no building-use type for prisons and presents a challenge when attempting a performance comparison.

CDCR has saved millions of dollars given the two-prong approach taken to meet the goals of EO B-12-18, including the implementation of energy-efficiency projects and entering into third party PPAs. These methods provided cost savings to CDCR by ensuring permanent energy reductions and by providing a pre-determined rate approach when purchasing renewable energy.

Table 20- Department-wide Energy Trends (without Renewables)
Facility Data Workbook Table 3.5

Year	Floor Area (ft ²)	Total Site kBTU Consumption excluding Renewables	Department Average Site EUI
Baseline Year 2002	38,998,597	6,339,377,948	163
2013	46,644,879	6,097,589,607	131
2014	48,163,049	5,526,135,269	115
2015	48,291,977	5,650,116,677	117
2016	49,091,627	5,671,969,324	116
2017	49,599,347	5,531,545,404	112
2018	49,725,763	5,533,243,601	117
2018 Goal	49,844,546	5,071,502,358	102



As **Table 20** and the corresponding graphs indicate, the footprint of CDCR has grown by over 8.3 million square feet from 2003 to 2018 with further construction adding to this. In light of 2015, 2016 and 2018 growth, CDCR has consistently reduced energy consumption through extensive conservation and retrofit efforts. The continuation of the energy efficiency program and the expansion of the renewable program are integral ways for CDCR to meet the Governor's sustainability goals.

Table 21- 2016 Energy Reductions Achieved (without Renewables)

Purchased Energy Compared to Baseline	Number of Facilities	Floor Area (ft²)	Current Year kBTU Consumption	Percent of Total Energy
20% Reduction Achieved	17	18,207,544	1,801,195,241	32%
Less than 20% Reduction	24	26,333,816	3,581,959,136	64%
Unspecified Baseline (if any)	4	5,182,641	238,886,837	4%
Totals	45	49,724,001	5,671,969,324	100%
Department-wide Reduction	12%			

CDCR has two primary strategies to achieve energy reductions and comply with existing EO mandates, laws, and regulations:

1. CDCR is working with a consultant to prepare a Climate Action Plan (CAP) that will quantify GHGe and reduction measures for CDCR's core operations. The baseline GHGe inventory will be used to develop the forecasting of future GHGe, GHGe reduction targets for future years, new or expanded GHGe reduction measures to meet the targets, and an action plan that specifies how CDCR will implement these measures. The purpose of preparing GHGe forecasts is to determine changes in emissions that would occur in the future, relative to baseline conditions. The forecasts are necessary to illustrate the potential effects of growth in population, employment, or other factors that could result in changes to future emissions, such as actions others may take in response to existing laws and regulations.
2. CDCR plans to continue to develop and implement energy efficiency projects through the CDCR/IOU Partnership program, special repair, grants, and other opportunities. CDCR and the IOUs have developed a statewide energy efficiency audit schedule in the IOU territories **Table 22**. These audits will be used for planning future energy efficiency projects. Additionally, ESS utilizes its established Architectural/Engineering pool to conduct energy efficiency audits in non-IOU territories.

Through the IOU partnership, energy audits were originally performed in 2006 for the institutions within the IOU territories. The last phase of prioritized audits has been deployed in support of the current phase of projects. Currently, CDCR and the IOUs are coordinating the next phase of audits in support of the next cycle of energy efficiency projects. CDCR is exploring other energy audit opportunities for the institutions that are not within the IOU territories. Some of these opportunities include utilizing the Energy and Sustainability Section's qualified pool of Architects and Engineers.

Energy Efficiency Program

Table 22- Energy Surveys
Facility Data Workbook Table 3.7

Fiscal Year	Total Department Floor Area (ff ²)	Energy Surveys Under Way (ff ²)		Percent of Department Floor Area (ff ²)	
		Level 1	Level 2	Level 1	Level 2
2005-2006	41,457,027	-	9,196,993	0%	22%
2007-2008	41,457,027	-	5,252,136	0%	13%
2016-2017	49,091,627	-	2,624,739	0%	5%
2017-2018	49,599,347	-	33,399,206	0%	67%
2019-2020	49,982,523	-	2,735,233	0%	5%

CDCR leverages existing resources using strategic partnerships with California's IOUs to assess and implement energy efficiency projects, utilize rebates, and obtain zero-percent loans through the partnership, as administered by the California Public Utilities Commission (CPUC) for energy saving projects. CDCR also locates and secures grants, loans, incentives and rebates for energy efficiency projects such as energy-efficient boilers- Installation of New Energy Efficient Boilers at CCI **Figure 13**.

Figure 13- Installation of New Energy Efficient Boilers at CCI



In accordance with Government Code Sections 4217.10-4217.18 and Public Utilities Code Section 388, CDCR establishes a pool of Energy Service Companies (ESCOs) to compete in a Request for Proposal process for energy efficiency projects. Performance-based energy savings contracts are awarded based on the following: Preliminary Assessment, Proposal Evaluation, Project Application,

and Investment Grade Audit. CDCR's current pool consists of seven qualified ESCOs.

**Table 23- Summary of Energy Savings Achieved through Energy Efficiency Projects
Facility Data Workbook Table 3.6**

Year Funded	Energy Savings (kBTU/yr.)
2010-2012	188,762,876
2013	32,324,937
2014	68,117,968
2015	18,588,481
2016	10,836,062
2017	51,741,664
2018	4,945,547

Since the start of the CDCR/IOU Partnership program in 2006, CDCR has completed 108 energy efficiency projects in existing buildings and new construction. The total cost of the energy efficiency projects is approximately \$73 million, which have been funded from support funds, loans and/or grant programs. The IOUs have paid over \$19 million in incentives, resulting in an overall annual savings of \$8.5 million for CDCR. These savings are used to repay the grant or loan programs; after these debts are retired, these projects provide ongoing energy and cost savings.

**Figure 14- High Pressure Sodium Fixtures vs. Energy Efficient LED Fixtures
Before and After**



Figure 14 Highlights a lighting retrofit project at Pelican Bay State Prison.

Leadership in Energy and Environmental Design

The USGBC developed green building rating systems to advance energy, material efficiency, and sustainability known as LEED for Building Design and Construction (LEED BD+C), LEED for Building Operations and Maintenance (LEED O+M), and

LEED Interior Design and Construction (LEED ID+C). EO B-18-12 and the *Green Building Action Plan* require new State buildings and major renovations of 10,000 square feet or more, to be designed, constructed, and certified at LEED Silver or higher; also new State buildings under 10,000 square feet must meet applicable California Green Building Standard's Tier 1 measures.

Additionally, the *Green Building Action Plan* requires all existing State buildings over 50,000 square feet to complete LEED O+M certification and meet an Energy Star rating of 75 (or an alternate energy standard established by the California Energy Commission) to the maximum extent that such certification is cost-effective.

CDCR has made significant progress in designing and constructing new Capital Outlay Projects to meet the LEED BD+C Silver or Gold rating. LEED certification details were noted previously in the Green Operations Building Design and Construction section. There are nine additional projects in various phases of design or construction that are projected to meet a minimum of LEED-Silver rating. The RJD Level II Dorm facility (multiple buildings) is pending LEED-Silver certification remaining projects are HCFIP buildings located at CCC, CMC (two buildings), FSP, SOL, a new Central Chiller Plant at ISP, and two 50-bed MHCF projects located at CIM and RJD.

Figure 15- Central Health Services - SQ



CDCR has identified 23 buildings that are eligible for LEED O+M certification but obtaining this certification is challenging. Currently, most CDCR prisons have only one master utility meter installed. Sub-meters must be installed on eligible buildings in order to obtain an Energy Star rating needed to meet the requirements for LEED O+M certification.

In addition, Energy Star ratings currently do not exist for correctional buildings throughout the country. CDCR is in the process of installing sub-meters on two qualifying buildings (CHCF Shared Services Building and at the new Central Health Care Services Building at SQ **Figure 15** to collect one year's data to fulfill the prerequisite baseline information and to help develop the standards for a correctional facility Energy Star rating. Both buildings are anticipating LEED O+M certification. CDCR has allocated funding to award a phased contract for building sub-metering for the remaining 21 buildings. CDCR is planning to evaluate the LEED O+M Volume Certification Program based on the results of the two pilot projects. In 2019, CDCR completed a comprehensive Energy and Water Survey working with the US Department of Energy (US DOE), the Association of State Correctional Administrators, the American Correctional Association's Sustainability Committee, Green Prisons.org, and the Lawrence Berkeley National

Laboratory in an effort to create a category for correctional facilities that will be recognized by the Energy Star rating criteria. The US DOE is optimistic that the US EPA will grant the addition of this category, allowing CDCR and others to make better progress in measuring and improving upon existing building performance levels.

Demand Response

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

CDCR's mission is to improve public safety through law enforcement that provides for the safe and secure incarceration of the State's most serious and violent felons; to provide parole supervision and develop; and to implement rehabilitative strategies to successfully reintegrate offenders back into their communities. CDCR has developed energy strategies that fit within its primary mission. One of those strategies is to participate in demand reduction to support California in avoiding any rolling blackouts.

In 2008, CDCR developed a Demand Response program for all of its facilities. This program is updated annually and provides each site with the flexibility to maintain program operations while shifting energy-intensive activities to earlier in the day to avoid peak hours. Currently, SCE is the only IOU that has a program that provides CDCR the flexibility that a prison system needs when it comes to participation in demand response. However, all State-owned CDCR facilities participate in demand reduction regardless of whether or not there is an IOU Demand Response Program. Given the nature of the CDCR facilities, there are challenges in implementing a utility-sponsored Demand Response program. In order to shed load, extensive coordination is required which takes more time than the 24-hour notice currently given by the Independent System's Operator. The load reduction support that the facilities can offer within a 24-hour notice is to avoid increasing their load during a curtailment notice and provide a combined estimated reduction of 200kW. CDCR is able to verify participation of the institution by verifying that the loads of the participating institutions did not increase as expected during the curtail timeframe.

**Table 24- Demand Response
Facility Data Workbook Table 3.8**

Demand Response Participation	Number of Buildings/Sites	Estimated Available Energy Reduction (kW)
Number of Buildings/Sites Participating in 2018	39	200

Number of Buildings/Sites Participating in 2019	39	200
All Department Buildings (Totals)	45	Not Tracked
All Department Buildings (Percent)	87%	N/A

Renewable Energy

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 PPAs.

Although there are no specific kW goals for renewable energy, renewable energy does count towards meeting the ZNE goal for 2025 and the 20 percent grid-based energy use reduction by 2018.

CDCR is involved in ongoing studies to review feasibility for each adult institution and is continually assessing technological advancements in wind, water, solar energy sources, and battery storage opportunities in alignment with the *Green Building Action Plan*.

As of December 2019, CDCR has installed solar photovoltaic arrays at 14 institutions: CCI, CCWF, COR, CTF, CVSP, FSP, ISP, LAC, NKSP, PVSP, SAC, SOL, SVSP, and WSP. CDCR generates approximately 74 million kWh of power annually, which is roughly equivalent to the energy required to power at least 7,339 homes.

Figure 16- Solar Canopy System - SAC



These solar arrays were constructed by a third-party vendor at its expense in exchange for CDCR purchasing the electrical power from the solar field operator at discounted rates, allowing CDCR to significantly reduce projected energy costs over the next 20 years. CDCR has also installed several smaller solar arrays (5-25 kW) on several newly constructed buildings to meet the energy demands of these buildings and to achieve higher levels of LEED certification.

Several solar projects totaling 17 MW are in construction and scheduled to be complete in 2020 at the following institutions: CAL, CCWF, CEN, CIW, and WSP. Additional solar projects have been awarded and are in the design phase and are planned for construction during 2020-2022 at the following institutions: ASP, CAL, CCI, CEN, CIM, CMC, CTC, CTF, CVSP, ISP, KVSP, LAC, MCSP, NCCYCC, PVSP,

RJD, SOL, SVSP, VCYF and VSP. These projects are estimated to bring an additional 61.55 MW into CDCR's renewable energy portfolio.

Figure 17- Wind Turbine and Solar - CTF



Wind energy has also been incorporated into CDCR's renewable energy portfolio. Wind turbines were installed at CTF, LAC and SVSP. These wind projects increase the Department's renewable energy portfolio by approximately 5.4 MW which contributes to CDCR's overall renewable energy portfolio and puts the Department on track to exceed the power grid reductions specified in EO B-18-12.

Based on the current plan, over 43 percent of CDCR's total power is expected to be powered by renewable energy. In 2018, CDCR achieved a 20 percent reduction on energy use compared to a 2003 baseline, thereby complying with the Governor's EO.

Table 25- On-Site Renewable Energy Facility Data Workbook Table 3.9

Status	Number of Projects	Capacity (MW)	Estimated Annual Power Generation (kWh)
Renewables in Operation	17	40.36	80,429,354
Renewables in Construction	5	17	34,269,289
Renewables Proposed	24	61.55	132,992,077
Renewable Totals⁴	46*	118.91	247,690,720
			Total Electrical Usage
Department Wide Totals	N/A	N/A	580,483,845
Department Wide Renewable Percent (2018)	N/A	N/A	13.49%
Department Wide Renewable Percent (Including Proposed)	N/A	N/A	43.35%

*46 projects at 25 sites

⁴ A number of the proposed sites are already included in the operating/in-construction site count.

Monitoring Based Commissioning (MBCx)

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

MBCx can help CDCR develop a prioritized energy management roadmap. With real time data from MBCx, CDCR can continually address inefficient facilities and buildings that are drifting out of calibration. As building systems change, user requirements shift, or energy economics fluctuate, the building with MBCx can keep pace. Traditionally, the IOUs' MBCx programs have required a remote access for implementation. Given the safety and security requirements at CDCR institutions, these programs did not meet the Department's DCG and could not be considered. Currently, the IOUs are in the process of defining new programs that will be run by third parties, and not the IOU's. These programs are still in the developmental stage. Once these programs are finalized and readily available for customers, CDCR is planning to assess the available options and determine if the new programs can meet safety and security requirements.

Financing

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

CDCR has been successful in fulfilling many of the State mandates of energy efficiency and sustainability. CDCR has sought out various funding opportunities as they become available and has taken the lead in promoting additional funding opportunities by participating in policy discussions on topics such as OBF and OBR.

CDCR has utilized and will continue to explore multiple funding opportunities including GS \$Mart loans, OBF, municipal utility company loan and incentive programs, ARRA loans, Department of Water Resources loans and grants, and Solar or Wind PPAs.