

ARCHITECTURE AT ZERO

2021-22

A design competition for Decarbonization, Equity and Resilience in California



SOL HARVEST VILLAGE

BAR ARCHITECTS

SAN FRANCISCO, CA

TYPICAL POD PLAN



- 1. Porch
- 2. Storage
- 3. Amenity Room
- 4. Multi-Purpose
- 5. Unit Entry Mud Area Storage
- 6. Laundry
- 7. Movable Solar / Privacy Screens

- 8. PV Arrays - 150 kW System
- 9. Centralized DOAS
- 10. Centralized HP
- 11. Mass Timber Structure
- 12. PV Trills Over Parking
- 13. Community Roof Garden
- 14. South Facing Vertical Gardens
- 15. Outdoor Deck at Level 2
- 16. Typical Pod
- 17. Unconditioned Brezeway
- 18. High Performance Envelope
- 19. Distributed Amenity Rooms

PROJECT NARRATIVE

The Söl Harvest Village is conceived to support a close-knit community focused on low carbon indoor-outdoor living. Organized around a central shared courtyard, the Village is full of amenities and flexible open spaces and provides a multitude of services. The design creates a strong sense of place and identity for each resident. Our zero net energy solution also includes:

- Careful site response to optimize solar access and PV power production
- Highly efficient centralized building systems
- Dedicated outside air filtration and energy recovery to remove environmental hazards and optimize energy use
- Healthy materials used throughout
- Low carbon mass timber construction

The site plan maximizes outdoor space by placing the parking along the perimeter on the east and south sides of the site. Building scale encourages interaction among residents. Each "Pod" contains a mix of apartment types and ranges from 3 to 27 units. All units have a gracious "porch" to extend the living area and make a strong connection to the outdoors. Porches provide a high degree of sun shading in this hot environment. Amenity and service spaces are decentralized and are provided in each "Pod". These flexible multi-use spaces are located on each floor.

The design reaches zero net energy performance with an integrated, multi-pronged approach. Reduced energy demand is achieved through careful massing and envelope design, high efficiency heat pump systems driving low energy radiant heating and cooling. We supplied the remaining energy requirements with on-site energy generation, including rooftop photovoltaic and solar-thermal panels and through wastewater heat recovery.



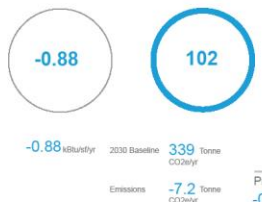
CENTRAL COURTYARD VIEW



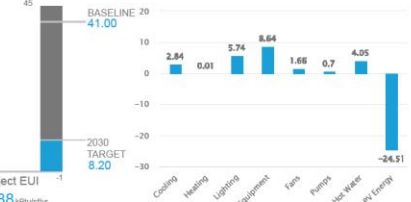
ROOF PLAN



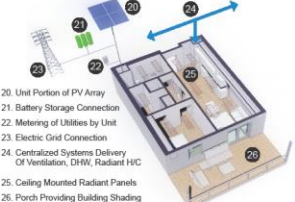
3RD FLR PLAN



PREDICTED BASELINE EUI CO2 REDUCTION % BENCHMARKING ENERGY



PREDICTED WHOLE BUILDING EUI BREAKDOWN



SYSTEM DISTRIBUTION DIAGRAM - RESIDENTIAL UNIT

- 20. Unit Portion of PV Array
- 21. Battery Storage Connection
- 22. Metering of Utilities by Unit
- 23. Electric Grid Connection
- 24. Centralized Systems Delivery Of Ventilation, DHW, Radiant HVAC
- 25. Ceiling Mounted Radiant Panels
- 26. Porch Providing Building Shading



BUILDING SECTION A



SITE / GROUND FLR PLAN

1. Project Narrative

Project Narrative

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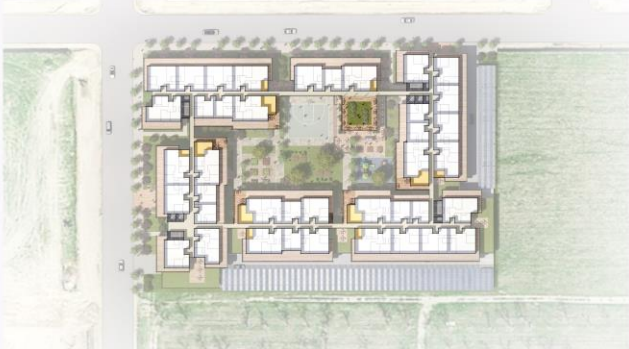
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2. Site Plan



3. Floor Plans



4. Perspective Drawing



5. Illustrated Sections

A. PV Arrays - 158 kW System

The system uses bi-facial panels mounted on a dual tilt racking system set at a 12 degree angle. Panels tilt toward east and west which lowers efficiency slightly but optimizes roof area, while it eliminates self shading of panels.

B. Dedicated Outdoor Air System - DOAS + ERV

All supply and ventilation air passes through an energy recovery ventilator. Reclaimed energy is used to temper incoming air and can be reused in other systems. 100% outside supply air is filtered (MERV 13) to remove any hazardous environmental pollutants.

C. Air Source Heat Pumps Drive Radiant Heating / Cooling + DHW

ASHP's connected to ceiling mounted radiant panels in the residences provide highest occupant comfort and highest efficiency space conditioning. Window to wall ratio is limited to 35% to minimize thermal loads. Radiant floors are used in the two story Community Hall. ASHP's at Level 1 provide domestic hot water.

D. Adjustable Exterior Shading

All units have deep porches and a complement of exterior sliding panels to adjust to individual needs for shading and for privacy. Residents can overlap panels to create various levels of shading or privacy. All units are configured with high/low operable windows to promote natural ventilation for times when the air quality meets acceptable levels.

E. Mass Timber Structure

All buildings have mass timber structure to reduce embodied carbon. Mass timber panels are utilized for the floors and glue laminated members are used for columns and beams.

F. Straw Bale Walls

The envelope of the Community Hall is constructed using straw bales. This locally sourced material creates a super insulated envelope and establishes a connection to the agricultural heritage of this region. The use of straw converts a waste product into a useful low carbon building material.



BUILDING SECTION A

6. Mechanical System Summary

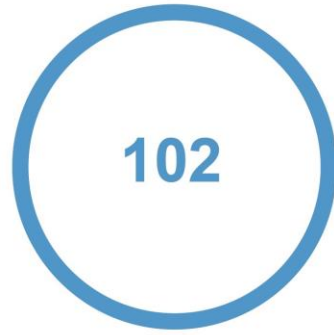


7. Annual End-Use Summary Table



-0.88 kBtu/sf/yr

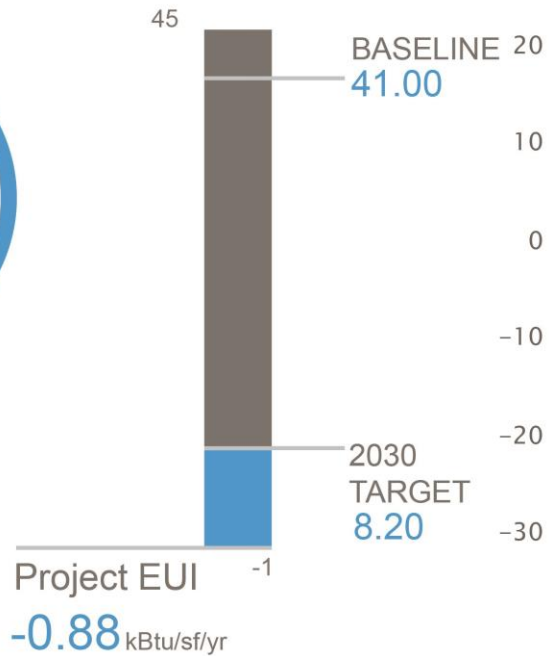
PREDICTED BASELINE EUI



2030 Baseline **339** Tonne CO2e/yr

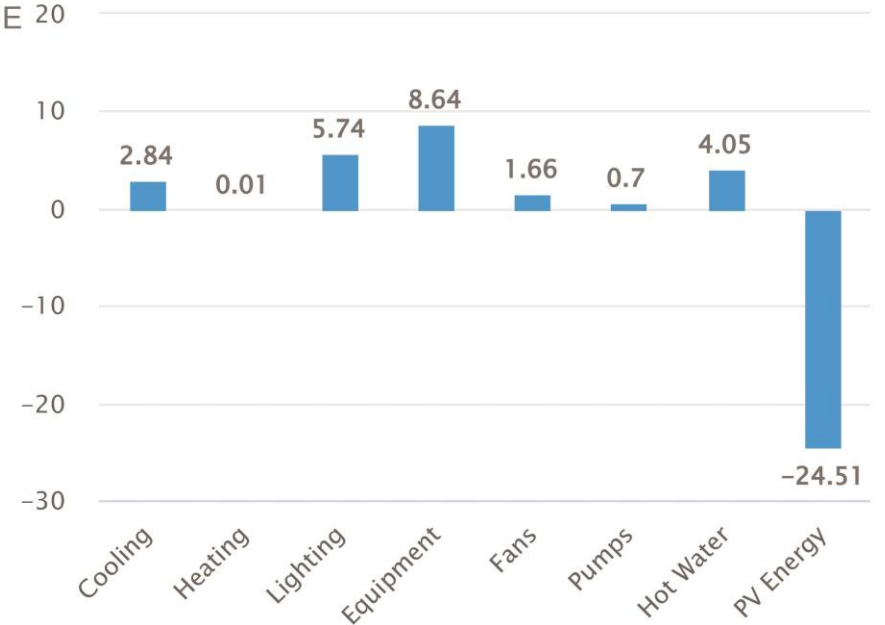
Emissions **-7.2** Tonne CO2e/yr

CO2 REDUCTION %



Project EUI **-0.88** kBtu/sf/yr

BENCHMARKING ENERGY



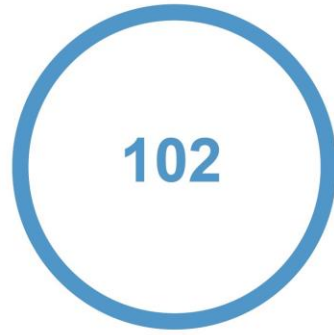
PREDICTED WHOLE BUILDING EUI BREAKDOWN

8. Monthly End Use Energy Consumption Bar Chart



-0.88 kBTU/sf/yr

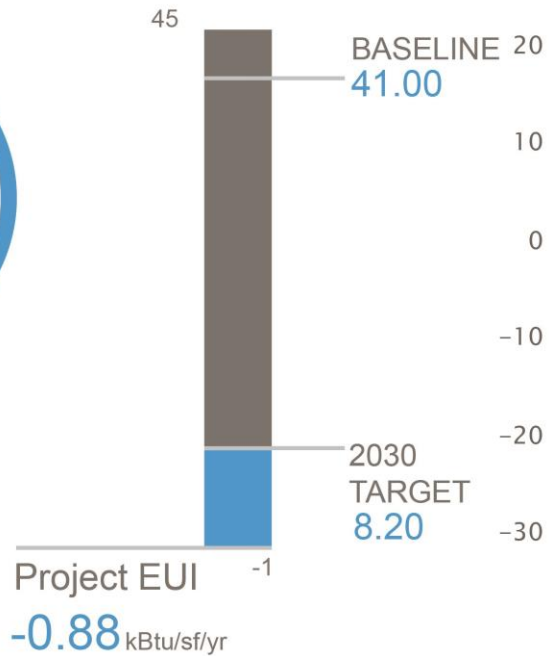
PREDICTED BASELINE EUI



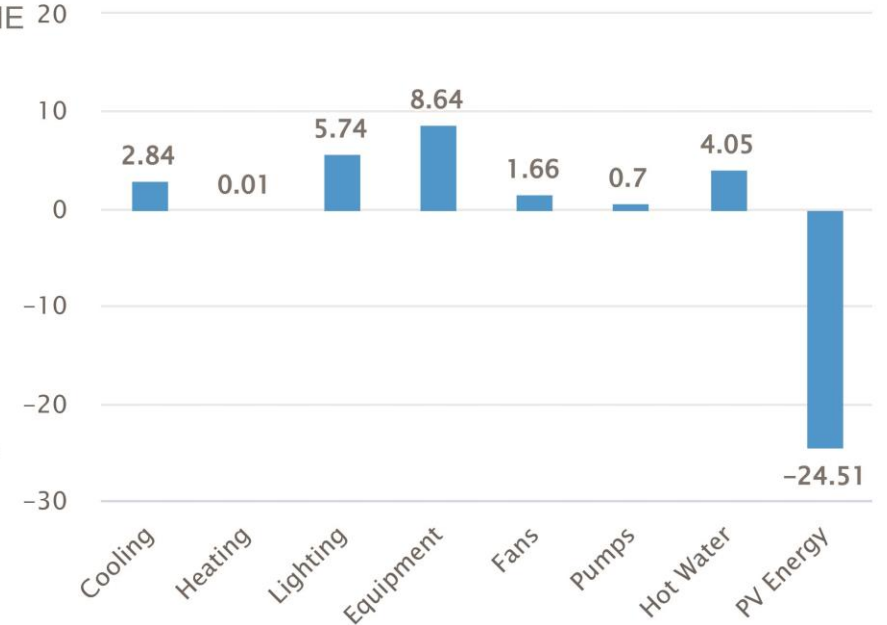
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CO2 REDUCTION %



BENCHMARKING ENERGY



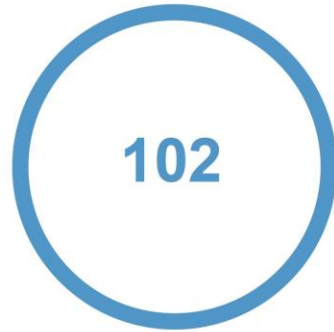
PREDICTED WHOLE BUILDING EUI BREAKDOWN

9. Hourly load shapes for energy and emissions



-0.88 kBTU/sf/yr

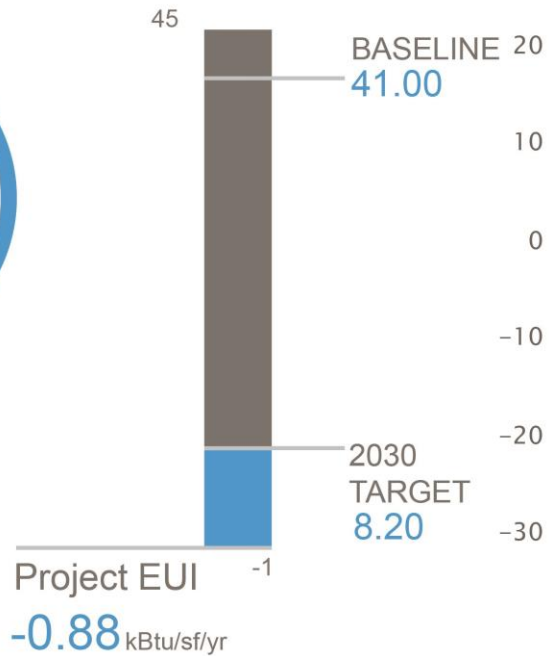
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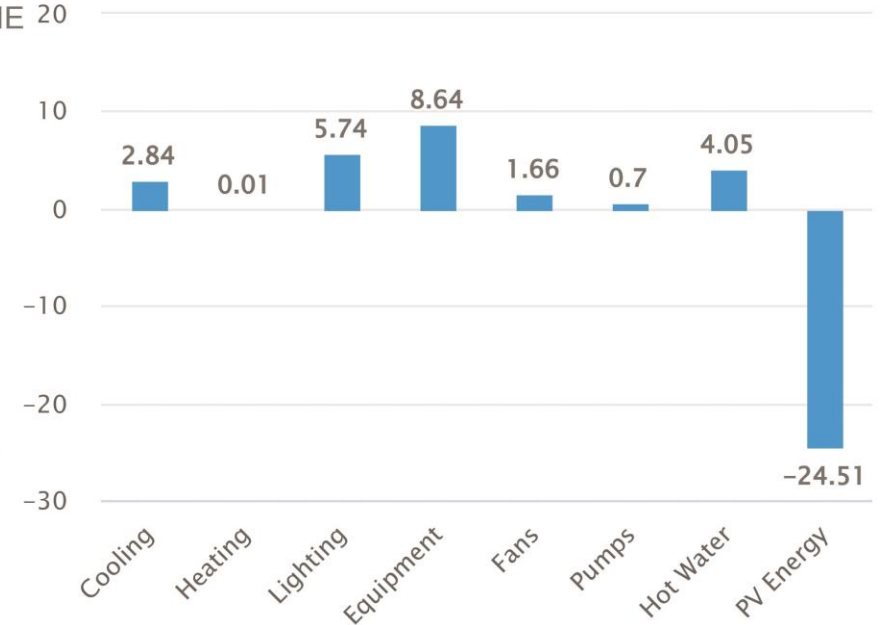
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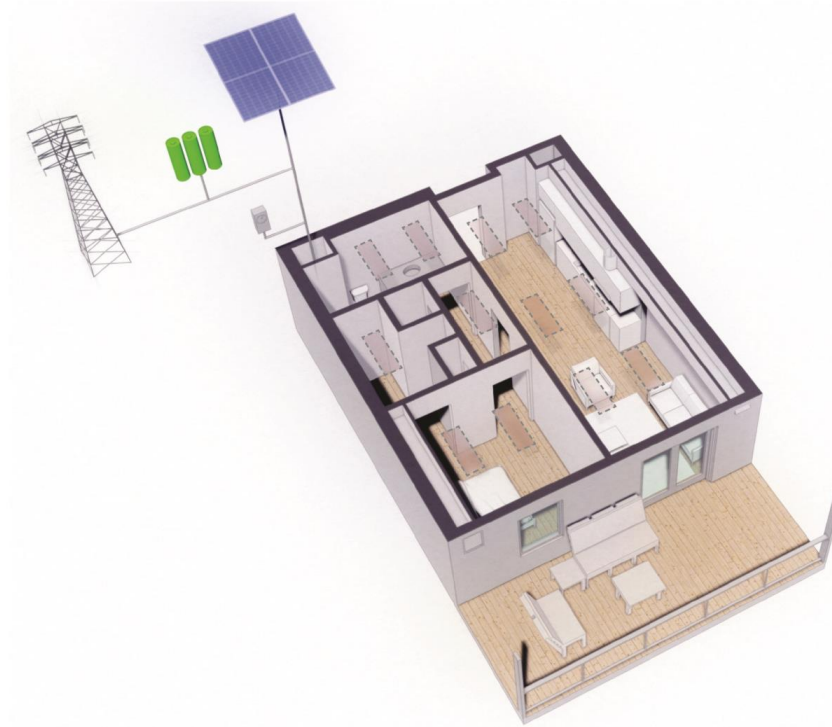


BENCHMARKING ENERGY



PREDICTED WHOLE BUILDING EUI BREAKDOWN

10. Details of renewable energy systems



11. Storage Systems



B EQUITY Essay

Equity at SōL Harvest Village:

SōL Harvest Village addresses equity – cultural, social and environmental, in multiple ways. To avoid the significant challenge of preconceived ideas of how families from different cultural backgrounds live and work, we interviewed staff from a farmworker support non-profit organization in Hollister CA, as well as a Visalia resident to get a sense of the larger community. This effort proved invaluable in clarifying what was essential to create more equity for the families. Our understanding is that family and the sense of community is very strong and dominant in the farmworker culture, which is predominantly Latinx in the region, calling for a design response that supports a strongly connected community, or ‘extended family’;

- SōL Harvest Village is a series of connected ‘neighborhoods’, or “Pods”, scaled to allow people to connect with each other and create a cohesive and supportive community.
- SōL “Pods” are organized around a series of exterior common spaces – focused on exercise, sport, community vegetable gardening, a children’s play area, a BBQ area or an open lawn, which offer opportunities to for the residents to gather in myriad ways. These spaces extend the living area available to residents and enhances the sense of the larger cohesive community.
- In addition to the centralized exterior amenity spaces, each “Pod” contains flexible amenity spaces, including cooking facilities, that provide opportunities for multiple families or individuals to gather, serving as further extensions of the living area for all residents.
- A central community hall, serves a wide variety of uses, from larger community gatherings, meetings and performances to providing classroom space for youth and adults as well as housing the village’s community youth center or after-school programs.
- Covered private porches extend the living area of the individual units and create a buffer zone between private and public space permitting people to engage with the larger community more or less actively, depending on their circumstances, while reinforcing that they are part of a supportive community.
- The private porches also provide flexible outdoor space where families can grow plants or vegetables which can help address the chronic issue of food insecurity for farmworkers and their families, also promoting improved air quality.
- Knowing farmworkers disproportionately incur high rates of acute and chronic injuries, disease and disability, it’s essential for the housing to provide a healthy environment for the residents. Specifically to minimize the amount of contaminants entering the homes, SōL Harvest Village incorporates two layers of wash areas outside the units. The first is next to the parking, where heavily soiled clothes can be removed and cleaned, isolating them from the living areas. The second is just outside the unit entry, to place less soiled clothes prior to entering the living areas, further helping to improve IAQ.
- With most residents having limited finances, providing a variety of internal and external spaces for people to gather and live expands their functional living area is essential to creating a more equitable community living environment for the farmworkers and their families.

C. Climate Adaptation Assessment Matrix

PROJECT NAME:		Sul. Harvest Village	
IMPACT	ADAPTIVE MEASURE	USING THIS MEASURE? (Y/N)	IF THE PROJECT IS EMPLOYING THIS MEASURE, BRIEFLY DESCRIBE TECHNICAL SPECIFICATIONS
HEAT	Is the project providing shade that will provide shade to awnings, balconies, terraces, streets, or parking lots?	Y	Concrete awnings over the perimeter on west and north sides provide shade parking.
	Is the project ensuring insulation or shading?	Y	R-20 walls, R-30 Roof system. Community building will be constructed of Stone/Ins. R-60 walls.
	Is the project installing cool roofs?	Y	TPO Membrane White wash system. PV cover on a significant portion of roof.
	Is the project reducing windows or glass entrance area maximum window associated with cooling?	Y	Cooling is provided by 100% Flow return radiant system with a COP of 1.40
	Is the project providing a community cooling center?	Y	The community building will be a cooling center available to the residents and nearby community.
	Is the project using permeable surfaces?	N	No permeable in permeable surfaces.
	Is the project requiring agricultural water (irrigation, landscaping, or maintenance) or outdoor water (fountains, greenhouses, waterfalls, waterfalls, or waterfalls) with permit or storage? (Negative or neutral)	Y	The site is currently unwatered and will stay that way for most of the year.
	Does a new any additional measures employed to increase water efficiency?	Y	Grey (1000) percent of the perimeter of the residential buildings provide later watering of driveway.
PRECIPITATION CHANGE <i>(e.g., droughts, an increase in precipitation events)</i>	Is the project setting up an ongoing mechanism to conserve water?	Y	A rainwater catchment tank necessary and secondary filtration system. By 100% Catchment will be used to collect rainwater energy from wastewater and to provide greywater for use in toilet flushing and irrigation.
	Is the project providing irrigation, soil health, soil quality, or soil shading?	N	No.
	Is the project reducing waterfalls, waterfalls, or riparian flows?	N	No.
	Is the project planting native, drought-tolerant vegetation?	Y	Native and drought-tolerant planting will be used in the courtyard and site perimeter. Waterfalls and fountains will be removed. Planting will use drought-tolerant planting.
	Is the project changing permeable surfaces to porous surfaces? (Negative or neutral)	Y	The site is unwatered and will be using porous areas using water in the east portion of the site. Planting techniques will be improved. An interlocking tile on manager area treated on site.
	Is the project increasing water use? (Negative or neutral)	Y	The site is unwatered and will be using between 600-800 people in the residential development as well as various acreage and existing maintenance water requirements.
Does a new any additional measures employed to increase water efficiency?			
WILDFIRE	Does the project increase water management plans to maintain adequate or maintain in a high priority landscape?	N	No.
	Does the project increase revegetation plans in a high priority landscape (irrigated or native)?	N	No.
	Does the project increase site water protection plans to mitigate wildfire threats to communities?	N	Water is located in a Fire Hazard Zone.
	Is the project implementing other types of forest or other strategies to manage forest conditions to reduce wildfire intensity or reduce potential impacts or losses?	N	No.
	Is the project implementing other fire mitigation or prevention measures for non-forest available land only (irrigated or native)?	N	No.
	Does the project increase water contribution in a high priority landscape for reducing or preventing wildfire threats? (Negative or neutral)	N	No.
	Does the project increase a backup power source (e.g., utility outage or power loss energy generation) to provide cooling management in case of emergency power source?	Y	The project will have utility backup energy by PV power. It will be interconnected with the voltage power distribution system to be used during emergency power source.
	Does a new any additional measures employed to increase water efficiency?		